WHAT IS CLAIMED IS:

1. A disk array device, which can be connected to a host device so as to be capable of communicating with each other, the disk array device comprising:

a disk array control unit which performs control of the entire disk array device;

a host side data transfer control unit which controls data transfer to and from the host device;

a disk array including at least plural data disk drives which constitute one parity group and one or more spare disk drives, wherein the one parity group has a large number of data stripes which are formed over storage areas of the plural data disk drives and the large number of data stripes can be partitioned into two or more sets of the data stripes;

a cache memory which is used for temporary storage of data to be transferred between the host device and the disk array; and

a subordinate side transfer control unit which controls data transfer to and from the disk array,

wherein the disk array control unit comprises:

a prediction section which predicts the likelihood of occurrence of a failure for each data disk drive; and

a divided data copy section which selects two or more data disk drives out of the plural data disk drives as objects of divided data copy according to the predicted likelihood

occurrence of a failure, selects two or more divided storage areas by selecting one divided storage area from each of the selected two or more data disk drives, the selected two or more divided storage areas belonging to different sets of the data strips in the parity group, and controls the subordinate side transfer control unit and the cache memory so as to copy data in the selected two or more divided storage areas to the one or more spare disk drives.

2. A disk array device according to claim 1,

wherein the disk array control unit further comprises a dynamic sparing section which selects one data disk drive as an object of dynamic sparing out of the plural data disk drives according to the predicted likelihood of occurrence of a failure, selects remaining divided storage areas, from which data has not been copied by the divided data copy section, from the selected one data disk drive, and controls the subordinate side transfer control units and the cache memory so as to copy data in the selected remaining divided storage areas to the spare disk drives.

3. A disk array device according to claim 2,

wherein, in the case in which the predicted likelihood of occurrence of a failure of a first data disk drive in the plural data disk drives has reached a first level, the divided data copy section selects at least the first data disk drive and a separate second data disk drive as objects of the divided

data copy, and

in the case in which the predicted likelihood of occurrence of a failure of the first data disk drive has reached a second level which is higher than the first level, the dynamic sparing section selects the first data disk drive as an object of the dynamic sparing.

4. A disk array device according to claim 1,

wherein, in the case in which the predicted likelihood of occurrence of a failure of the first disk drive among the plural disk drives has reached a predetermined level, the divided data copy section selects the first data disk drive and a second data disk drive, which has the largest predicted likelihood of occurrence of a failure after the first data disk drive, as objects of the divided data copy.

5. A disk array device according to claim 1,

wherein the divided data copy section controls the subordinate side transfer control unit and the cache memory so as to read out data simultaneously from the selected two or more divided storage areas in a course of copying the data in the selected two or more divided storage areas.

6. A disk array device according to claim 1,

wherein the disk array control unit further comprises a spare data updating section which, in the case in which a new request for writing data in the selected two or more divided storage areas from the host device is received from the host

side data transfer unit after the data in the selected two or more divided storage areas is started to be copied to the one or more spare disk drives, controls the subordinate side transfer control unit and the cache memory so as to write the new data received from the host device in the selected two or more divided storage areas and write the data in the spare disk drives as well.

7. A disk array device according to claim 1,

wherein the divided data copy section selects first and second data disk drives as objects of the divided data copy from the plural data disk drives, selects a first divided storage area belonging to a set of front side data stripes in the parity groups from the first data disk drive, selects a second divided storage area belonging to a set of rear side data stripes following the set of front side data stripes from the second data disk drive, and controls the subordinate side transfer control unit and the cache memory so as to copy data in the first and the second divided storage areas to the spare disk drives.

8. A disk array device according to claim 1,

wherein the two or more divided storage areas selected from the two or more data disk drives by the divided data copy section have substantially the same size.

9. A disk array device according to claim 1,

wherein the two or more divided storage areas selected

from the two or more data disk drives by the divided data copy section have different sizes according to the predicted likelihood of occurrence of a failure of the two or more data disk drives.

10. A disk array device according to claim 1,

wherein the prediction section stores an error occurrence history for each of the data disk drives and predicts the likelihood of occurrence of a failure for each of the data disk drives on the basis of the stored error occurrence history.

11. A method for, in a disk array device, which can be connected to a host device so as to be capable of communicating with each other, comprising:

a disk array control unit which performs control of the entire disk array device;

a host side data transfer control unit which controls data transfer to and from the host device;

a disk array including at least plural data disk drives which constitute one parity group and one or more spare disk drives, wherein the one parity group has a large number of data stripes which are formed over storage areas of the plural data disk drives and the large number of data stripes can be partitioned into two or more sets of the data stripes;

a cache memory which is used for temporary storage of data to be transferred between the host device and the disk array; and

a subordinate side transfer control unit which controls data transfer to and from the disk array,

the disk array control unit to spare data in the data disk drive using the spare disk drive, the method comprising:

a step of predicting the likelihood of occurrence of a failure for each of the disk drives;

a step of selecting two or more data disk drives as objects of divided data copy out of the plural data disk drives according to the predicted likelihood of occurrence of a failure;

a step of selecting two or more divided storage areas by selecting one divided storage area from each of the selected two or more data disk drives, wherein the selected two or more divided storage areas belong to different sets of data stripes in the parity group; and

a step of performing the divided data copy by controlling the subordinate side transfer control unit and the cache memory so as to copy data of the selected two or more divided storage areas to the one or more spare disk drives.

12. A method according to claim 11, further comprising:

a step of selecting one data disk drive as an object of dynamic sparing out of the plural data disk drives according to the predicted likelihood of occurrence of a failure; and

a step of selecting remaining divided storage areas, from which data has not been copied to the spare disks, from the selected one data disk drive, and controlling the subordinate

side transfer control units and the cache memory so as to copy data in the selected remaining divided storage areas to the spare disk drives.

13. A method according to claim 12,

wherein the step of selecting two or more data disk drives is performed in the case in which the predicted likelihood of occurrence of a failure of a first data disk drive among the plural data disk drives has reached a first level, and then at least the first data disk drive and a separate second data disk drive are selected as objects of the divided data copy, and

the step of selecting one data disk drive is performed in the case in which the predicted likelihood of occurrence of a failure of the first data disk drive has reached a second level higher than the first level, and then the first data disk drive is selected as an object of the dynamic sparing.

14. A method according to claim 11,

wherein the step of selecting two or more data disk drives is performed in the case in which the predicted likelihood of occurrence of a failure of the first disk drive among the plural disk drives has reached a predetermined level, and then the first data disk drive and a second data disk drive, which has the highest predicted likelihood of occurrence of a failure after the first data disk drive, are selected as objects of the divided data copy.

15. A method according to claim 11,

wherein, in the controlling step, the subordinate side transfer control unit and the cache memory are controlled so as to read out data simultaneously from the selected two or more divided storage areas.

16. A method according to claim 11, further comprising a step of, in the case in which a new request for writing data in the selected two or more divided storage areas from the host device is received from the host side data transfer unit after the step of performing the divided data copy is started, controlling the subordinate side transfer control unit and the cache memory so as to write the new data received from the host device in the selected two or more divided storage areas and write the data in the spare disk drives as well to thereby update the data in the spare disks.

17. A method according to claim 11,

wherein, in the step of selecting two or more data disk drives, first and second data disk drives are selected out of the plural data disk drives, and

in the step of selecting two or more divided storage areas, a first divided storage area belonging to a set of front side data stripes in the parity groups is selected from the first data disk drive, and a second divided storage area belonging to a set of rear side data stripes following the set of front side data stripes is selected from the second data disk drive.

18. A method according to claim 11,

wherein, in the step of selecting two or more divided storage areas, two or more divided storage areas having substantially the same size is selected.

19. A method according to claim 11,

wherein, in the step of selecting two or more divided storage area, two or more divided storage areas having different sizes are selected according to the likelihood of occurrence of a failure predicted for the two or more data disk drives.

20. A data sparing control device for, in a disk array device, which can be connected to a host device so as to be capable of communicating with each other, comprising:

a disk array control unit which performs control of the entire disk array device;

a host side data transfer control unit which controls data transfer to and from the host device;

a disk array including at least plural data disk drives which constitute one parity group and one or more spare disk drives, wherein the one parity group has a large number of data stripes which are formed over storage areas of the plural data disk drives and the large number of data stripes can be partitioned into two or more sets of the data stripes;

a cache memory which is used for temporary storage of data to be transferred between the host device and the disk array; and

a subordinate side transfer control unit which controls data transfer to and from the disk array,

controlling an operation for sparing data in the data disk drives using the spare disk drives, the data sparing control device comprising:

a prediction unit which predicts the likelihood of occurrence of a failure for each of the data disk drives;

a divided area selection unit which selects two or more data disk drives as objects of divided data copy out of the plural data disk drives according to the predicted likelihood of occurrence of a failure and selects two or more divided storage areas by selecting one divided storage area from each of the selected two or more data disk drives, wherein the selected two or more divided storage areas belong to different sets of data stripes in the parity group; and

a divided data copy unit which controls the subordinate side transfer control unit and the cache memory so as to copy data of the selected two or more divided storage areas to the spare disk drives.